



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(54) Title: PARKING METER TIMER</p> <p>(57) Abstract</p> <p>A timing apparatus for remotely monitoring time remaining on a parking meter and within a predetermined time from expiration of the meter, warning a user. The timing apparatus is initiated using a button (40) that causes fifteen minutes increments, thus mimicking a parking meter. The timer (12) then counts backward toward zero but before reaching zero, warns the user via an audible alarm or vibration (18) that the meter will soon expire. Upon expiration, short alarm is sent and a violation is visibly posted in the time indicator portion (16) of the timing apparatus.</p> <div data-bbox="878 1157 1528 1892"> </div>		

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# Parking Meter Timer

## Background of the Invention

The present invention relates generally to the field of timing devices. More particularly, the invention relates to timing devices for monitoring a parking meter and for alarming after a predetermined period thereby warning the user the parking meter will soon expire.

5       Parking meters are a common site in most cities across the nation. They allow a person to park a vehicle in a certain location for a fixed period of time. The fixed period of time is determined by purchasing subintervals of time, usually fifteen minute segments, for a fee. While the fee itself is generally nominal, overstaying the fixed period of time that was purchased can result in a municipality assessing a notice of  
10       parking violation that may require payment of a substantial penalty.

      Prior art has taught the use of time indicating devices attached directly to a key holder (see Crapster, U.S. Patent No. 2,596,374; Wolski, U.S. Patent No. 4,064,722). While these devices allow the user to remain cognizant of the current time, they are not helpful with actively reminding the user the time on the parking meter is about to  
15       expire.

      Another attempt at solving this problem was made by N. Pesa (U.S. Patent No. 4,641,125) where a key holder alarms each time the key is removed from the ignition. This approach utilizes the weight of the housing to extend a chain attached to the keys. Upon removing the keys from the ignition, the chain retracts into the housing alarming  
20       to remind the user to set the attached stopwatch. Then, once the stopwatch is set, the alarm sounds at the expiration of the set period.

      One of the problems with this approach is the constant alarming, since only a small percentage of times a user parks is actually at a parking meter, it becomes a nuisance that the alarm goes off each time the keys are removed from the ignition.

25       Another problem is bulk, the key holder relies on the weight of the housing to extend the chain. The key holder, therefore, must have enough weight to pull the housing down and must be large enough to hold the winding of chain. This bulkiness and weight makes the system inconvenient for a user.

A further problem is that once the stopwatch is set, the alarm only sounds at the expiration of the full period not allowing the user any time to get back to the meter before it is in violation.

## Summary

The aforementioned and other problems are solved by the invention which provides, in one aspect, a timing apparatus. The invention provides an extremely versatile timer with alarming features useful for timing parking meters, inter alia. The system is enclosed within a housing having a rigid bottom portion and a translucent top portion, similar to that of a parking meter. The rigid bottom portion encases an activation means, a timer means, signal means and an alarm means.

The activation means is for initiating a counting interval by incrementing timer values by a discrete amount to then statically defining a meter value. The discrete amount may mimic a parking meter and increment in fifteen minute intervals.

The timer means responds to the activation means and is operable between the meter value and a zero time position. The timer means derives a dynamic definition of timer values as the timer values proceed from the meter value toward the zero time position. Once it reaches the zero time position, the counting interval is terminated.

The signal means is electrically connected to the timer means for transmitting an alarm signal upon reaching a predetermined value. The predetermined value is between the set value and the zero time position.

The alarm means functions in response to the alarm signal to warn that the predetermined value has been reached by the timer means. This is useful for notifying a user of the timing apparatus that the time in the meter is about to expire.

In further aspects, the invention provides methods in accord with the apparatus described above. The aforementioned and other aspects of the invention are evident in the drawings and in the description that follows.

### **Brief Description of the Drawings**

The foregoing and other objects of this invention, the various features thereof, as well as the invention itself, may be more fully understood from the following description, when read together with the accompanying drawings in which:

- 5       Figure 1 shows a block diagram of a meter timer in accordance with the invention;
- Figure 2 illustrates a key ring embodiment utilizing the meter timer of Figure 1;
- Figure 3 illustrates a key embodiment utilizing the meter timer of Figure 1;
- Figure 4A is a block diagram of the timer according to the invention;
- Figure 4B is a block diagram of the lighting system of the invention; and
- 10       Figure 5 is a detailed block diagram of a mechanical timer for use with the invention.

## Detailed Description

While the present invention retains utility within a wide variety of timing devices and may be embodied in several different forms, it is advantageously employed in connection with a key holder for automotive keys or as an integral part of the automotive key itself. Though these are the forms of the preferred embodiment and will be described as such, these embodiments should be considered illustrative and not restrictive.

Figure 1 portrays generally a block diagram of a parking meter timer 10 according to the invention. The parking meter timer 10 is activated by an initiation signal 14 which is transmitted to a timer circuit 12. The timer circuit is incremented by a predetermined amount each time the initiation signal is transmitted and then begins to count backward towards its starting position. In the preferred embodiment where it is a parking meter being timed, the amount the timer is incremented reflects the time increment on the parking meter itself. In other words, since parking meters generally increment their timers in fifteen minute segments as each coin is inserted, so follows the parking meter timer in increments of fifteen minutes each time the initiation signal is sent.

The movement of the timing circuit 12 is transformed into an indicator signal 20 which is sent to an indicator device 16. The indicator graphically illustrates the time remaining in the parking meter. As the time dwindles, the timing circuit accordingly signals the indicator to reflect the diminishing time.

At a predetermined point in the time interval, the timing circuit 12 notifies a user that it is time to proceed back to the meter before time on the parking meter completely expires. In the preferred embodiment, the notification is transmitted when five minute remain on the parking meter.

The notification is transmitted by the parking meter timer 10 via an alarm circuit 18. The alarm circuit 18 is activated when the timing circuit 12 determines that an alarm condition has arisen and transmits an alarm signal to the alarm circuit 18. The signal is received by an alarm circuit which immediately notifies the user of the alarm status.

A separate light signal 26 may be sent to cause an illumination device 24 to light the indicator providing enhance viewing in poorly lit environments.

Figures 2(A) and 2(B) illustrate two views of one embodiment of the invention where the parking meter timer 10 is in the form of a key ring. In this form, the key ring timer housing 30 is compact and thin but provides an easy to read indicator.

The timer housing 30 is fabricated with a rectangular bottom 31 having rounded corners to enhance carrying comfort, and a rounded hollow translucent top 33 extending from the top of the rectangular bottom 31 to form an enclosed void 32. In the preferred embodiment, the translucent top 33 is made from a scratch resistant acrylic resin such as LUCITE which is a trademark owned by DuPont.

In the interior of the rounded translucent top 33 is a gauge 34 marked with the units of measure. Though this may be displayed in any of various increments, the preferred embodiment provides one minute granularity. The gauge 34 is a segment of an annular ring displaying a range of timer values. The range in the preferred embodiment is zero to two hours.

A pointer 36 extends from the rectangular portion of the key ring timer housing 30 and indicates on the gauge 34 the time remaining on the parking meter. The pointer is connected to the timing circuit (not shown in this Figure) held within the housing 30. The pointer is moved in accordance with the time remaining in the parking meter as determined by the timing circuit 12 by any of numerous methods, such as a gear configuration, commonly known in the art.

Behind the pointer 36 there is a violation sign that is shown in a depressed position since time is indicated by the pointer 36 as still remaining on the parking meter. Upon expiration of time on the meter, the violation sign 38 pops up substantially filling the void 32 with a visual alarm indicating that the time on the parking meter has lapsed. In the preferred embodiment, the violation sign 38 mimics that of a parking meter by having a bright color and by being embossed with the word "VIOLATION".

An initiation button 40 is used to begin the timing process upon depression. A user pushes the initiation button 40 on the front face of the housing 30 causing the timing circuit 12, and therefore the pointer 36, to increment. Each time the initiation button 40 is depressed, the timing circuit 12 increments by the interval simulating an



additional coin being placed in a parking meter. Again, a fifteen minute increment is used in the preferred embodiment to parallel a parking meter.

The initiation button 40 is concave such that the edge of the initiation button 40 when in a nondepressed position is flush with the front face of the housing 30 but the center of the button is recessed into the housing 30. This design ensures that a user does not accidentally depress the button and initiate a timing sequence.

Another embodiment of the gauge 34 is an annular ring, as opposed to the segment of the ring as previously described. In this form, there are multiple sections of the ring each scribed with different possible time ranges where the initial range is zero to one hour. If the initiation button 40 is depressed repeatedly causing the timer circuit to exceed the one hour limit as indicated by the gauge, the pointer is automatically recalibrated to reflect a change in range, i.e. that the meter has a two hour time limit. In such an instance, the gauge is rotated about its center in order to display the next segment displaying a two hour range. This process is again repeated for a three hour range.

To enhance visibility in poor lighting conditions, an illumination button 42 is located on one side of the housing 30. The illumination button, like the initiation button, has a surface that is flush with the housing 30. In this case it is the side of the housing 30 to which the button conforms while the front and back surfaces of the housing have cut away areas extending horizontally into the housing and vertically for the length of the button. These cut away areas accommodate the user's finger when depressing the illumination button 42.

When the illumination button 42 is depressed, two lights are illuminated. The first light is located in the top portion of the rectangular bottom 31 of the housing 30 with its illumination directed upward into the void 32 formed by the translucent top. In this way the first light illuminates the pointer 36 and the gauge 34 as well as the violation sign 38, if necessary.

The second light 56 is located in the base of the rectangular bottom 31. The second light 56 when illuminated projects illumination in the direction of the keys allowing a user to select the correct key or to show a keyhole.

The timer housing 30 has a toroidal ring 44 extending from the base of the rectangular portion to provide a connecting point to the housing. A chain 46 may be utilized to connect the parking meter timer to a ring 48 which holds keys.

5        Figures 3(A) and 3(B) illustrate a second embodiment of the invention where the parking meter timer 10 is an integral part of the key. The essential characteristics of the timer are as previously described except that in this instance the timer housing 50 accommodates a key. The rectangular bottom portion of the housing 50 additionally extends down the shaft of the key 52 to add rigidity to the structure.

10        Further modifications comprise an initiation button 40 slightly recessed with respect to the front surface of the housing to ensure that the added pressure applied to a key while the key is being turned in an ignition system does not engage the timer circuit 12. Also, the connector 54 is placed at the top portion of the housing 50 attached directly to the curved translucent surface. It is then rotated ninety degrees with respect to the previously described toroidal ring 44 to ensure that the key when  
15        placed on a key ring will hang parallel to the other keys.

      In practice, the parking meter timer of either of the described embodiments is actuated by the user at the time that coins are deposited into the parking meter. For example, the user parks next to a two hour meter where each quarter deposited purchases a period of fifteen minutes on the parking meter. The user purchases one  
20        and one half hours by depositing six quarters. The user then presses the initiation button 40 on the parking meter timer 10 six times, each press incrementing the timer circuit 12 by fifteen minutes. The pointer 36 is moved along the gauge with each press of the initiation button indicating to the user the amount of time purchased.

      After the fourth press of the initiate button, the timer circuit has exceeded its  
25        displayed range of one hour for a standard one hour meter. The timer circuit then forces rotation of the gauge 34 such that a segment of the gauge displaying a two hour limit is now shown. The timer circuit then repositions the pointer to indicate in the new range the proper time thus far requested.

      During the period that follows, the timer circuit 12 counts down from the set time  
30        backward toward zero. The pointer is adjusted with one minute granularity to indicate the current time remaining on the parking meter.

When five minutes remain a signal is sent by the timer circuit 12 to the alarm circuit 18 to warn the user to go deposit more coins in the meter. This notification may be performed in any of numerous ways, but the preferred embodiment employs primarily two methods. The first is an audio alarm transmitted by utilizing a compact internal speaker. The sound may be transmitted in bursts or as a single tone. The second method utilizes a vibrator. The vibrator causes the parking meter timer 10 to vibrate silently indicating to the user that action must be taken. The method of notification may be selectable by the user via a switch on the back of the housing 30 (not shown).

If the initiation button 40 is not depressed indicating more coins have been deposited before the expiration of the period, the alarm circuit 18 is again signaled to notify the user that the parking meter is in violation. At this point, a bright flag is raised within the indicator device 16 with the words "VIOLATION" in large bold print mimicking a parking meter and providing a visual reminder of the current status of the parking meter.

Referring now to Figures 4A and 4B, a more detailed block diagram of the timer 10 is shown. As previously described, the timer 10 is initiated by an initiation button 40 which transmits an initiation signal 14 to the Timing Circuit 12.

The initiation button 40 causes the timing circuit 12 to increment thus setting or advancing the timed interval. The actual action performed by depressing the initiation button 40 depends on whether the timing circuit is electrical, mechanical, or a hybrid electro-mechanical device. In the illustrated embodiment, the timing circuit 12 is a mechanical system and will be described with particular reference to Figure 5 which is a block diagram of a mechanical timing circuit. One skilled in the art will realize that an equivalent timing circuit designed with electronic circuitry or an electro-mechanical hybrid thereof can be substituted without detriment to the invention.

A power source 66 supplies power to the timer 12. The power source 66 is a battery for electrical and electro-mechanical timing circuits to supply electrical power to electrical circuitry. In mechanical systems, the power source is design dependent, but is generally a compressive energy storage device such as a spring.

The timing circuit 12 continually updates a display 16 as time is added by the user and is subsequently decremented by the timing circuit 12. The display 16 mimics a

parking meter by using a pointer across an arcuate scale to depict time remaining. For example, the pointer and arcuate scale can be electronic such as a liquid crystal display ("LCD"), can be a mechanical pointer pointing to a fixed scale, or a fixed pointer with a rotating scale.

5 As previously described, when the timing circuit 12 reaches a predetermined point in the timing interval, an anticipatory alarm 70 is generated. This alarm indicates that a set amount of time remains before time on the parking meter expires and indicates such an event to the user by audio or vibration. This allows the user to return to the meter before such an expiration. For example, this alarm would activate ten minutes before  
10 the parking meter expires allowing time to return to the meter to increase the meter value.

At the expiration of time on the parking meter, a time expiration alarm 74 goes off. This is the alarm that goes off once the meter has expired. Along with either an audio or vibration alarm, a visual alarm is indicated on the display 16 seen as a violation flag  
15 as previously described.

The illumination system uses a removable and replaceable battery 80 that is used to power a display light 84 and a key hole light 88. A illumination button 42 when depressed allows transmission of electric energy from the battery 80 to the display light to illuminate the display 16 and the key hole light 88 for projecting light on a key hole  
20 in a lock, for example.

Figure 5 is a more detailed illustration of a mechanical version of the invention. In this embodiment, depression of the initiation button 40 sets or advances the time interval by moving a ratchet 92, or equivalent actuator, which in turn transmits force to timing gears 94. A exemplary implementation of such a ratchet system is as follows.

25 The ratchet 92 is mechanically connected to the initiation button 40. Depression of the initiation button 40 causes a proximal end of the ratchet 92 to move inward relative to a pivot point located between the proximal end of the ratchet 92 and a distal end of the ratchet 92. This movement causes the distal end of the ratchet 92 to engage the timer 12. In this embodiment, the timer is controlled by gears 94. The action of the  
30 ratchet can then advance the time interval, for example, by mechanically interconnecting with the gears 94 to drive the gears 94 in a given rotation compliant to

a spring bias or by releasing an escapment allowing the gears 94 to rotate by a fixed amount in a direction compliant with the spring bias, inter alia. A result of such actuation being that the time interval is advanced by a predetermined interval.

If there is time remaining in the time interval when the initiation button 40 is engaged, the timer increments by the aforementioned predetermined incremental value. If the value exceeds the range indicated on the gauge, the time interval is reset to zero (This scenario ignores the multiple ranging gauge which was earlier described and which should be referred to for specific description of operation). The resetting function allows the user to zero the timer. Structurally, the action of engaging the initiation button 40 to force the indicator past the timer range causes the ratchet 92 to release. The time already having a return bias due to the spring 100 forces the gears 94 to drive the time interval and, therefore, the display 16 to zero.

In the case of a spring 100 driven mechanical timer as shown in Figure 5, a winder 96 is physically turned to move a ratchet 98. The ratchet 98 drives the gears 94 forward and permits the spring 100 to also drive the gears forward acting as the equivalent to a logical OR gate.

The spring 100 itself is a wound spring 100 that powers the time and the alarms.

A clutch 102 permits an escapment 104 (or balance wheel) to slow and regulate the unwinding of the spring 100. When the timer gears 94 reach a position corresponding to reaching the anticipatory time, the clutch 102 is released permitting the spring 100 to unwind, thus rapidly driving the gears that activate the audible alarm and the vibrating alarm.

As before, the time remaining is continuously updated on the display 16 using a calibrated time scale. Upon reaching a predetermined position an anticipatory alarm 70 is activated to warn the user. When the interval has expired the time expiration alarm 74 including the violation flag of the display informs the user of the event.

Either of the aforementioned alarms can be electronically or mechanically actuated. Electronic actuation is preferred for the audio and vibration type alarms but the visual alarm is more implementation specific. With regard to the latter, if the system implementation is electronic utilizing an LCD, the visual alarm is displayed accordingly actuated electronically. In the illustrated embodiment and many hybrid embodiments, a

mechanical interconnection is preferred and an exemplary mechanical structure is as follows.

5 The gears 94 rotate until a terminal point in the time interval is achieved. One of the gears 94 can, for example, have an a protrusion extending therefrom to drive the warning flag contrary to a spring bias thereby creating the visual alarm. Upon the depression of the initiation button to reestablish the time interval, the protrusion is rotated away from the warning flag and the spring bias forces the warning flag away from a visible area.

10 An alternative structure could include a detent. The violation flag would be spring loaded and biased toward an open, or visible, position. When time is added to the time interval, the flag is forced against the spring bias until the detent engages to hold the flag down. Upon expiration of the time interval the detent is removed releasing the flag to pop up under the force of the spring.

15 The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

## Claims

1. A hand-held, self-contained apparatus for signaling to a user a quantity of time remaining in a timed period, said apparatus comprising  
start signal means for initializing and subsequently incrementing the timed period from a zero position to a meter position, said meter position initially  
5 being equal to the timed period;  
counting means initiated upon receipt of said start signal means, said counting means capable of decrementing the timed period from the meter position toward the zero position in uniform steps of time;  
indicator means connected to said counting means for graphically illustrating  
10 the quantity of time remaining in the timed period; and  
alarm means for notifying the user upon receipt of a signal from the counting means that a predetermined amount of time remains before the counting means decrements the timed period to the zero position.
2. The apparatus according to claim 1 wherein said indicator means further comprises an illumination means for projecting light upon said indicator means.
3. The apparatus according to claim 1 wherein said indicator means comprises an analog time indicator having a pointer and a gauge, and a violation flag which is indicative of the analog time indicator having reached the zero position.
4. The apparatus according to claim 3 wherein said gauge comprises an annular ring scribed with a plurality of time ranges where said annular ring is rotatable to change said plurality of time ranges indicated by the analog time indicator.
5. The apparatus according to claim 1 wherein  
the entire apparatus is encased within a housing having a rigid bottom and a translucent top portion;

the start signal means is a pushbutton integrally located on the rigid bottom,  
5           said pushbutton when depressed advances a pointer along a gauge,  
          said gauge being an annular ring scribed with a plurality of time ranges,  
          said time ranges correlating to minute incremental values; and

          said gauge and pointer constituting said indicator means which is visible  
          through the translucent top portion of the housing; the position of said  
10          pointer in relation to said gauge at any instant in time denoting actual  
          time remaining in said time period; and said indicator means graphically  
          illustrates the remaining quantity of time in the time period as the time  
          decrements to the zero position.

6.       The apparatus according to claim 5 wherein a violation flag substantially fills  
          the translucent top portion of the housing, said violation flag remains hidden in  
          the rigid bottom portion of the housing until the timed period decrements to the  
          zero position.

7.       A hand-held, self-contained timing apparatus for indicating a timed interval has  
          expired comprising

          activation means for initiating a counting interval by incrementing timer values  
          by a discrete amount, the sum of the discrete amount then statically  
5          defining a meter value;

          timer means responsive to a signal received from said activation means, said  
          timer means capable of decrementing in uniform steps of time from said  
          meter value and a zero time position, for deriving a dynamic definition of  
          the quantity of time remaining in the timed interval as the timer values  
10         proceed from the meter value toward the zero time position to terminate  
          the counting interval;



indicator means connected to the timer means for graphically illustrating the quantity of time remaining in the timed interval from the meter value to the zero time position; and

15 signal means electrically connected to the timer means adapted to activate the alarm means upon receipt of the alarm signal, said alarm signal activated upon reaching the predetermined time value between the meter value and the zero time position.

8. The apparatus according to claim 7 contained within a housing having a rigid bottom portion and a translucent top portion.

9. The apparatus according to claim 8 wherein said indicator means further comprises an illumination means for projecting light upon said indicator means.

10. The apparatus according to claim 7 wherein said indicator means comprises an analog time indicator having a pointer and a gauge, and a violation flag which is indicative of the analog time indicator having reached the zero time position.

11. The apparatus according to claim 10 wherein said gauge comprises an annular ring segmented by time ranges where said gauge is rotatable to change the time range illustrated on the analog time indicator.

12. The apparatus according to claim 7 wherein the predetermined value is user defined.  
5

13. The apparatus according to claim 7 wherein said discrete amount is measurable as a quantity of minutes.

14. A method of signaling to a user an end of a timed period comprising  
incrementing the timed period from a zero position to a meter position;  
decrementing the timed period from the meter position toward the zero  
position in uniform steps of time;
- 5 notifying the user that a predetermined amount of time remains before the  
timed period is decremented to the zero position; and  
providing providing continuous visual feedback regarding a current status of a  
quantity of time remaining in the timed period.
15. The method according to claim 14 further comprising illustrating graphically  
time remaining in the timed period.
16. The method according to claim 15 further comprising projecting light upon said  
indicator means.
17. The method according to claim 15 wherein the step of illustrating time  
remaining in the time period is performed by rotating an annular gauge to  
project a proper time range and by calibrating an analog timer to display the  
timed period in said proper time range.

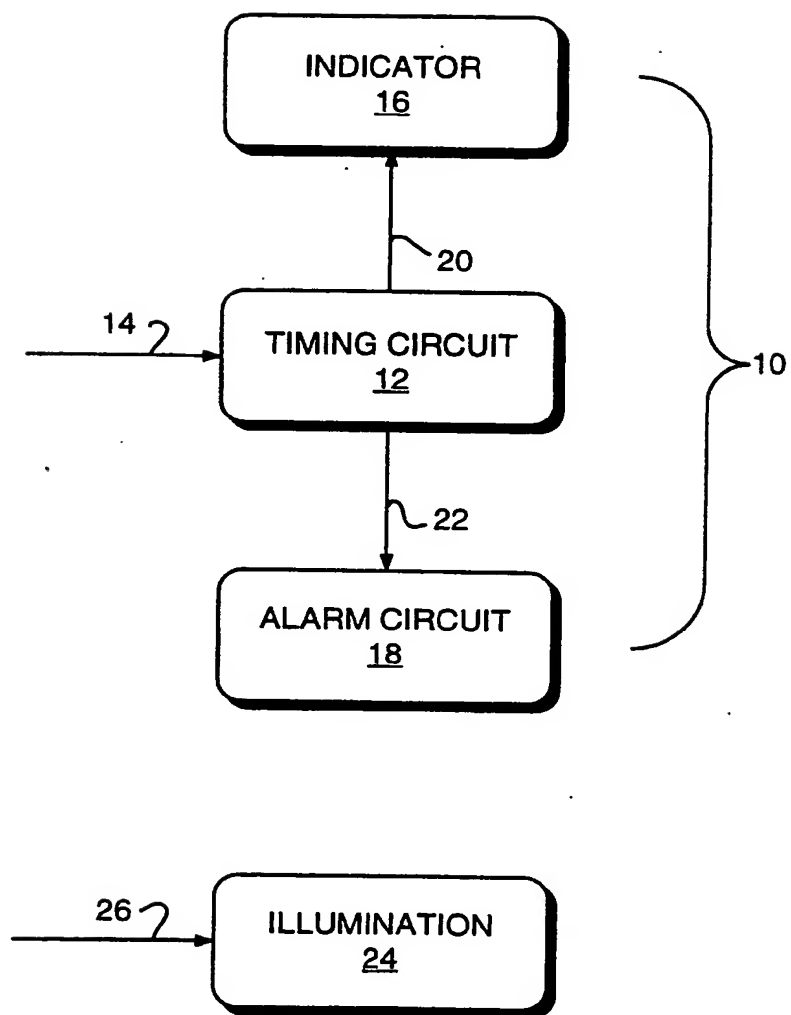


FIG. 1

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SUBSTITUTE SHEET (RULE 26)

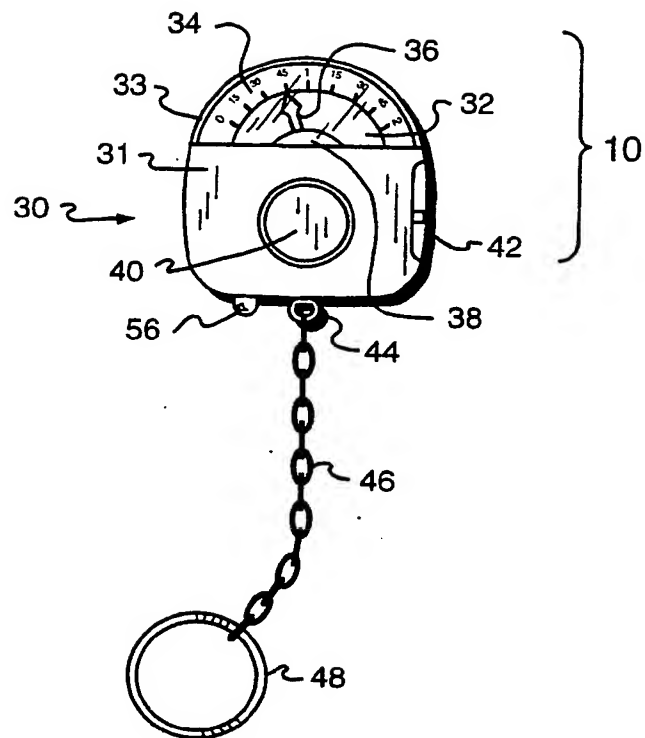


FIG. 2A

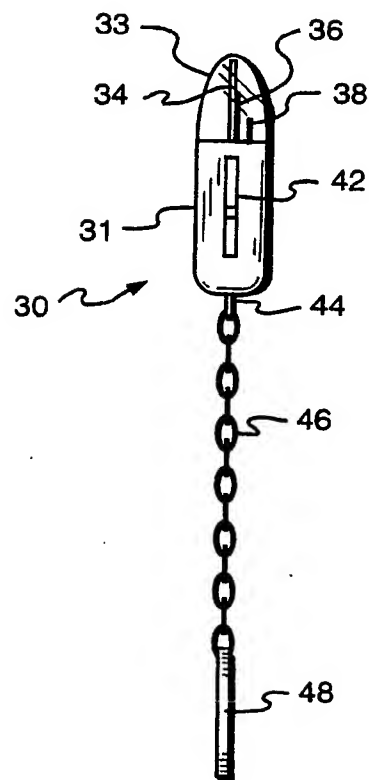


FIG. 2B

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SUBSTITUTE SHEET (RULE 26)

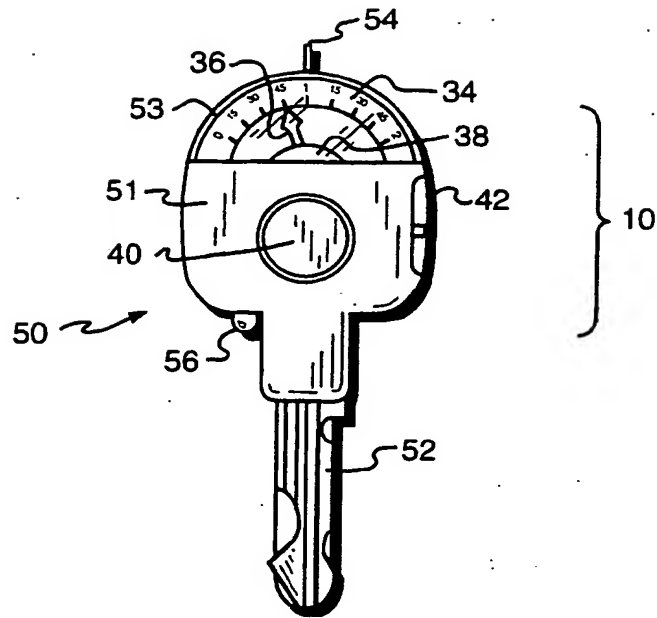


FIG. 3A

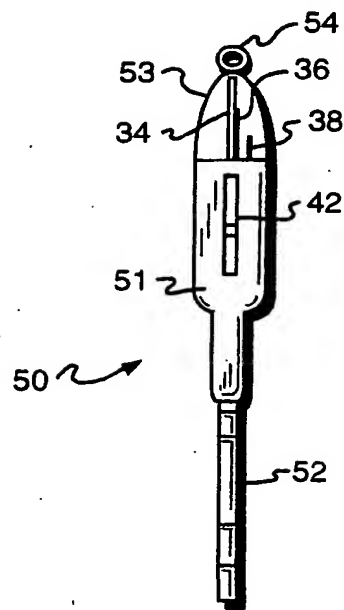


FIG. 3B

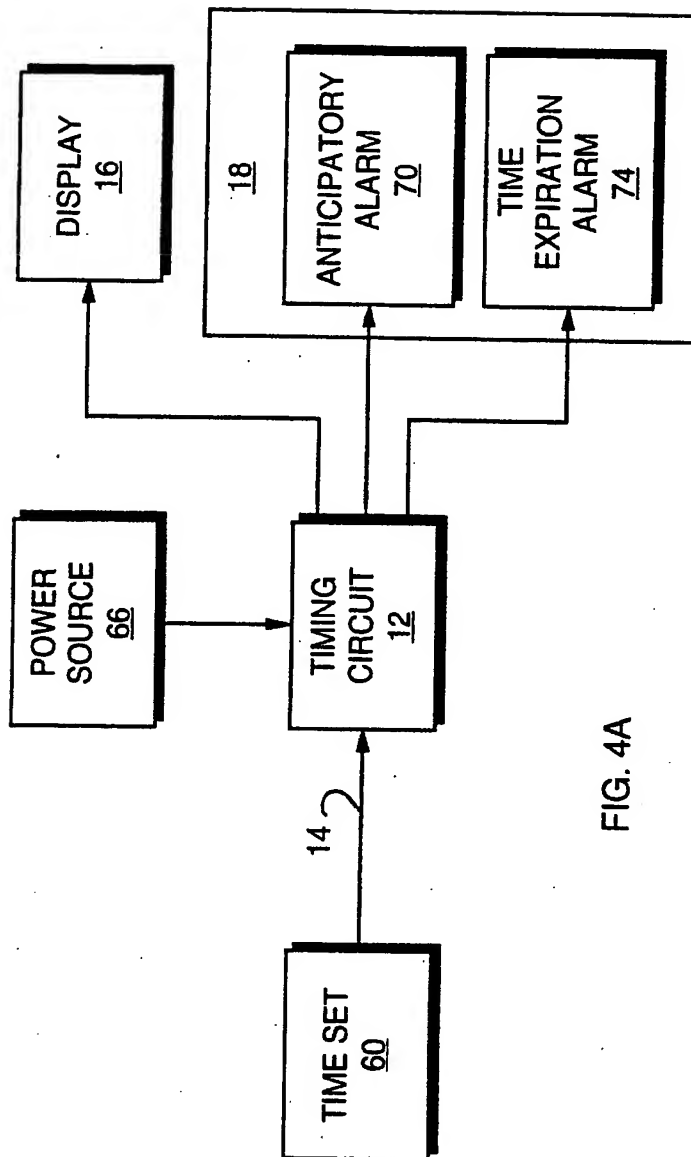


FIG. 4A

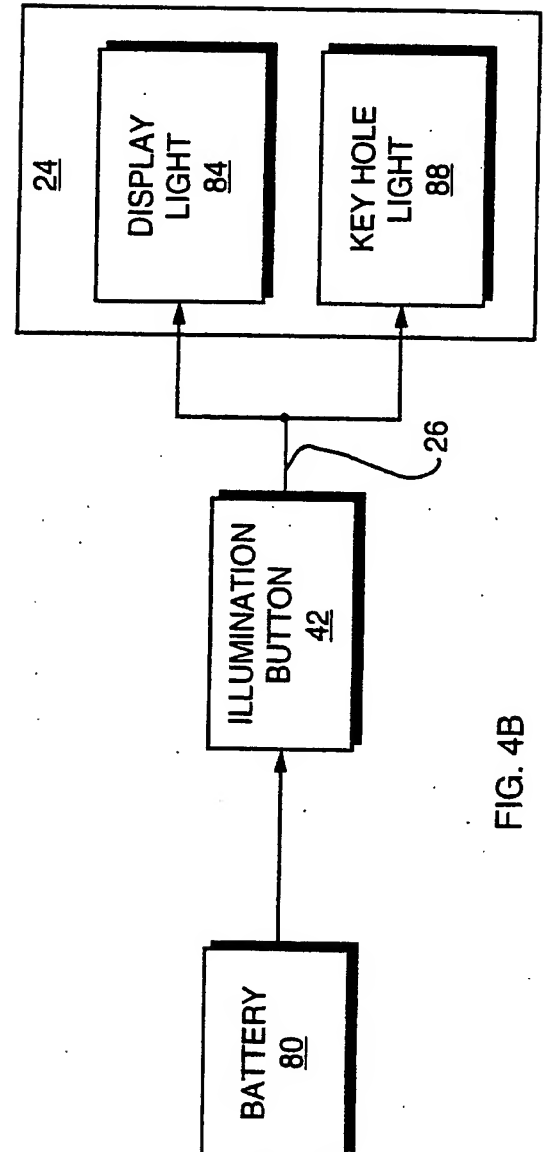


FIG. 4B

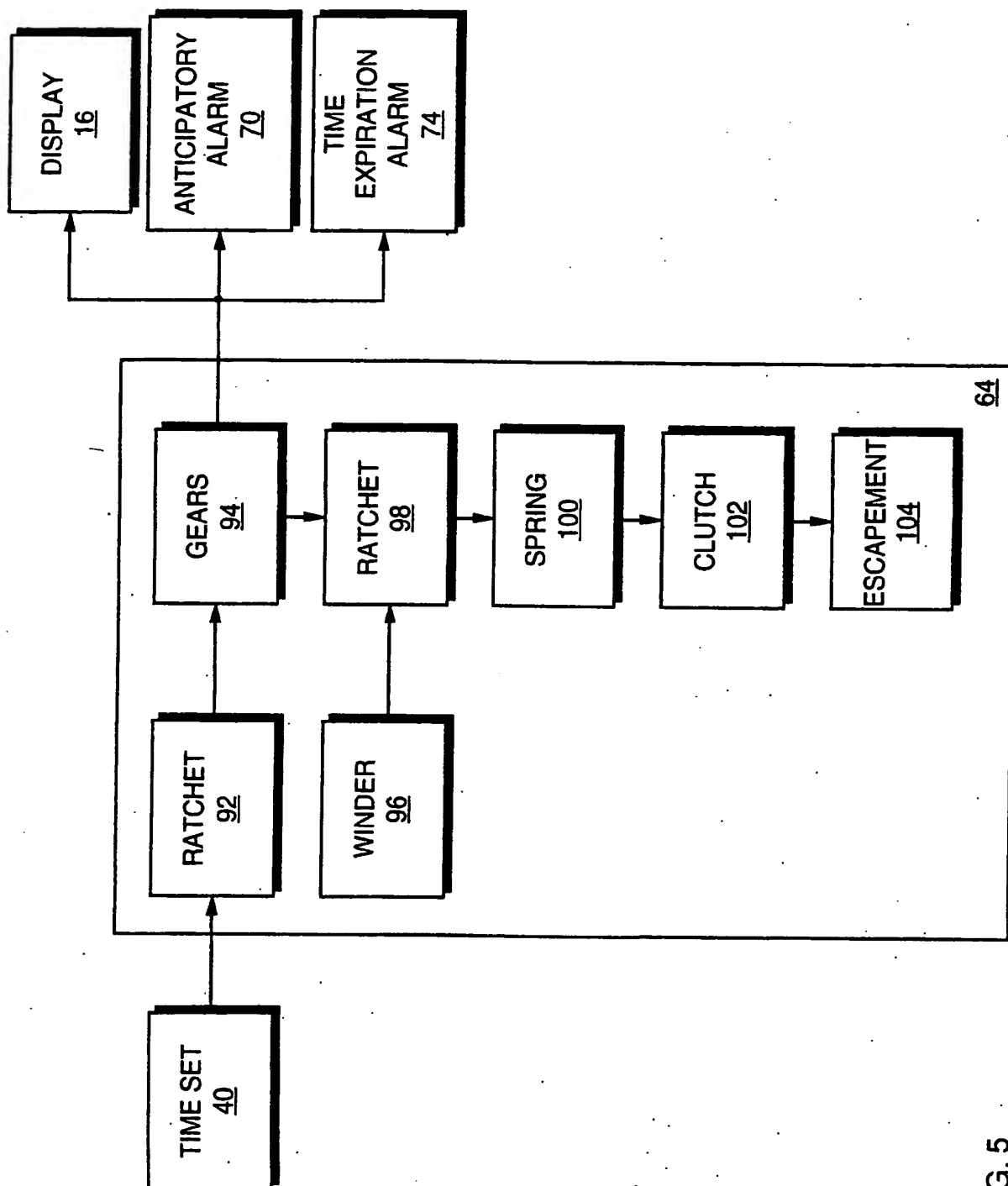


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/01162

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : G08B 3/00

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 340/309.4, 309.5, 384.1, 384.7

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 3,763,488 (KLASING) 02 OCTOBER 1973, see abstract, figure 1	1-17

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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**A. CLASSIFICATION OF SUBJECT MATTER:**  
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